STAFF REPORT

AIR QUALITY EMISSION OFFSETS - CONSTRAINTS AND OPPORTUNITIES FOR POWER PLANT DEVELOPMENT PROJECTS

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CALIFORNIA ENERGY COMMISSION

Pete Wilson, *Governor*

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Keith Golden

INTRODUCTION

This report provides information to decision makers and interested parties on the air quality constraints to and opportunities for developing new power plants in California. It is based on a description of air districts' ambient air quality standards attainment status, offset requirements, offset strategies allowed, and offset costs and availability. Air quality issues (particularly offsets availability) are often very complex when considered during the review of a power plant licensing case. This report hopefully provides the information needed to resolve some of these issues in advance of licensing cases.

A draft version of this report was issued in December, 1996 to all the air pollution control districts in the state, as well as the Air Resources Board. We received some comments and suggestions from a few districts, and we have incorporated those comments, as appropriate. A summary of the district comments are included in Attachment A.

SUMMARY

Based on our study, we have found that of the 33 air districts in California, about a third have sufficient offset credits to allow for power plant development, or do not require offsets; about a third allow the use of offset trading strategies which could possibly accommodate power plant development; and about a third cannot accommodate power plant development due to a lack of offset credits, or the lack of rules allowing offset trading strategies. These results are summarized and graphically represented in Attachment D.

It should be pointed out that this report only considers the option of offsetting a project's emissions where offsets would be secured from existing banked emission reduction credits (ERCs). As discussed later, we did not consider those situations where the contemporaneous shutdown of an existing source, or the reduction of its emissions, at the time of building a new emissions source could be used as an emissions offset.

STUDY APPROACH AND ASSUMPTIONS

Based upon past experience and the very competitive nature of the electricity generation business, we believe that the most common power plant technology to be sited in California in the foreseeable future will be natural gas-fired combustion turbines. Therefore we chose the following four gas-fired combustion turbine facilities to evaluate:

1. 40 MW LM6000 combined cycle set,

2. 95 MW project consisting of two LM6000 combustion turbines, one operating as a combined cycle unit and the second operating as a peaker unit,
3. 240 MW combined cycle project consisting of a single Frame 7F combustion turbine set and,
4. 400 MW combined cycle project consisting of two Frame 7F combustion turbine sets.

All of these technologies are currently available, although the "projects" are hypothetical. Some emissions data were derived from projects recently licensed by the California Energy Commission. These projects are presumed to use natural gas with no secondary fuel requirements, and use state-of-the-art emissions control systems (low NOx combustors and Selective Catalytic Reduction). Hourly, daily and annual NOx, VOC, PM10 and SO_2 emissions data were gathered for each of the projects.

A summary of the emissions from the four hypothetical projects is shown in Attachment B.

A series of tables, one for each of the four projects, was then prepared, showing the technical potential for siting that project (based only on offset availability) in every air district in California. Those four tables are attached as Attachment C.

ATTAINMENT STATUS

This study focuses on the one significant air quality constraint that power plant projects routinely face, the securing of emission offsets. The requirement for emission offsets is rooted in the attainment status of a particular district for federal and state ambient air quality standards. For example, if a district is designated attainment by the U.S. Environmental Protection Agency (EPA) and ARB for both the federal and state ozone standards, then usually (although not always) emission offsets of the ozone precursor emissions of oxides of nitrogen (NOx) and volatile organic compounds (VOCs) are not required for new stationary sources. Conversely, if a district is designated non-attainment for ozone, then NOx and VOC offsets will be required.

FEDERAL REQUIREMENTS

The Federal Clean Air Act requires that in districts which are designated non-attainment for ozone, emission offsets must be secured. The non-attainment designations are determined by the measured readings of ambient ozone levels. The higher the ambient levels, the more severe the designation. The more severe the designation, the lower the emission threshold for providing emission offsets. Table 1 shows the different offset thresholds for the various non-attainment designated districts. This table indicates that non-attainment districts include the Broader Sacramento area, San Joaquin Valley, and most of Southern California districts, including Santa Barbara, Ventura, South Coast, San Diego, Kern County Desert and Mojave Desert.

A transitional designation indicates that those districts are requesting that EPA redesignate them from non-attainment to attainment. EPA is currently reviewing their requests and has not made a decision at this time.

The districts not listed in this table are either classified as attainment or unclassified (insufficient data to determine attainment status), so that there are no offsets required.

For PM10, much of central and southern California are designated as non-attainment for the federal 24-hour PM10 standard. Those non-attainment districts include Sacramento, San Joaquin Valley, Mono Lake Basin and Mammoth Lakes Area of Mono County, the Searles Valley Planning Area which is located within the Inyo, Kern County Desert and Mojave Desert Districts, the Mojave Desert District, the South Coast Air Basin and Coachella Valley of the South Coast Air Quality Management District and the Imperial Valley portion of the Imperial County District.

Table 1: District Federal Ozone Designation

Non-attainment Designation	District	NOx and VOC Offset Triggers (tons/year)
Transitional	Imperial Butte N. Feather River	100
Moderate	Santa Barbara	100
Serious	San Diego San Joaquin Valley Kern County Desert	50
Severe	Ventura Broader Sacramento* Mojave Desert	25
Extreme	South Coast	10

* Broader Sacramento includes all of Sacramento and Yolo Counties, the eastern portion of Solano County, the southern portion of Sutter County, and all of Placer and El Dorado Counties except the Lake Tahoe Basin.

STATE REQUIREMENTS

Since the state ozone standard is more restrictive than the federal standard, many more districts in California are designated non-attainment for the state ozone standard. The state Clean Air Act requires that these districts prepare plans to reach attainment of the state ozone standard at the "earliest practical date". These plans typically include rule requirements for offsets of NOx and VOC for new sources. Like the federal law, the state law has a trigger level for offsets depending on the severity of the

district's ozone non-attainment designation. Table 2 shows the different offset thresholds for the non-attainment designated districts.

Even though the designations shown in Tables 1 and 2 may be the same (moderate, serious, severe and extreme), the means by which the EPA and the state ARB determine a designation are somewhat different. The state ozone standard is lower (0.09 ppm versus the federal 0.12 ppm) so that the ranges of the ambient ozone design levels to determine the designations are different. In addition, the ARB considers the effect of transport of pollutants from one district to a contiguous district in determining the designation. Transport of pollutants was a significant consideration in the designation levels for Kern County Desert, Mojave Desert, San Diego and Ventura Districts.

Table 2: District State Ozone Designation

Non-attainment Designation	District	NOx and VOC Offset Triggers (tons/year)
Moderate	Monterey Bay Unified San Luis Obispo San Barbara Colusa, Glenn N. Feather River Butte, Tehama Shasta, Imperial Kern County Desert Mojave Desert	25
Serious	Bay Area San Diego Broader Sacramento	15
Severe	Ventura San Joaquin Valley	10
Extreme	South Coast	0

Many of the mountain counties (Amador, Calaveras, Mariposa, Nevada, and Tuolumne) are classified as non-attainment, however, they are not required to develop and implement attainment strategies because of overwhelming air pollution transport impacts due to upwind districts.

The state ozone designations throughout California are shown in Figure 1. As can be seen, the only areas that are in attainment or unclassified (which is treated like an attainment area from a regulatory standpoint), are the districts in the northwest and northeast parts of the state. Because they are in attainment of the state ozone standard, they are not required to include an offset requirement in their New Source

Review[1] rules. Most of those districts (North Coast, Siskiyou, Modoc, Northern Sierra, Northern Sonoma, Mendocino and Lake) do not require emission offsets for ozone precursor pollutants (NOx and VOC).

The state PM10 designations throughout California are shown in Figure 2. As the map shows, virtually the entire state is classified as non-attainment. The reason that so many more areas are classified as non-attainment for the state PM10 standard versus the federal classification, is that the state 24-hour standard (50 $\mu g/m^3$) is one-third of the federal standard (150 $\mu g/m^3$). Consequently, many areas of the state that are below the federal standard are still above the state standard, and thus are designated as non-attainment.

Although many districts are in attainment of the federal PM10 standards, most of these districts have offset requirements for PM10. In the early 1980's, the ARB and many districts developed a combined New Source Review and federal Prevention of Significant Deterioration (PSD)[2] permitting process. Thresholds of significance under PSD were used as offsetting thresholds for New Source Review. Although not required by state law to reach attainment of the state PM10 standard, most of these districts (mostly "rural" districts such as Shasta, Lassen, Monterey Bay and San Luis Obispo as examples) have retained their PM10 offsetting requirements.

OFFSET REQUIREMENTS

We compared project emissions data to each air district's New Source Review rule requirements, specifically the offset (triggering) requirements. The District Offsets Availability Tables in Attachment C show the results of the offset triggering requirements. In those tables if offsets were not required, we used a "no" designation. If offsets were required, we used a "yes" designation.

OFFSET BANKS

Where a district's rules require offsets or emission reduction credits (ERCs), we inquired of the district staff whether they have an ERC bank, and if so, the quantities of ERCs currently available in their bank. We then compared the hypothetical project's emissions to the quantities of ERCs in the bank, to determine whether sufficient credits were available to offset the project's emissions. If the quantity of credits in the bank was greater than 200 percent of a project's emissions, then we gave a "high" rating to the ERC bank status. The footnotes in the lower left of each Attachment C table explain the criteria for determining the ERC bank status.

Figure 1: Area Designations for State Ozone Ambient Air Quality Standard

Figure 2: Area Designations for State 24-hour PM10 Ambient Air Quality Standard

This report only considers the option of offsetting a project's emissions where offsets would be secured from existing banked ERCs. We did not, nor could we without a significant extended effort, explore those situations where an offset could be supplied by a contemporaneous shutdown or emissions reduction of an existing source at the time of building a new emissions source. That type of offset usually involves reducing emissions from combustion sources by fuel switching or installing air pollution control equipment, or shutting down those combustion sources. This type of emissions reductions or contemporaneous shutdowns are usually from sources such as dry cleaners, refineries, existing power plants and boilers from industrial sources like food processing plants. Therefore, in those districts which we have designated that sufficient ERCs are not available, a project applicant could still propose a project if they provided a contemporaneous shutdown of an emissions source which was sufficient to offset the project's emissions. A contemporaneous shutdown situation is best exemplified by the Crockett Cogeneration Project, in which the existing C&H boilers were shutdown to provide most of the offsets necessary to satisfy the offset requirements for the project.

OFFSET COSTS

Offset cost data were gathered from the ARB "Emission Reduction Offsets Transaction Cost Summary Report for 1995," published in April, 1996. These data gave us an indication of whether there is an "active" ERC market in various districts, and the range of ERC costs. The offset costs however, were not used as a significant criterion in determining ultimately whether a district's offset requirements pose significant barriers to power plant development. This was done for two reasons. First, offset transaction data is very limited or absent in most districts. Second, low offset costs for one prospective applicant may be high to another prospective applicant, so we believed that the market would "weed-out" those applicants that don't have the financial resources available to purchase the required offsets.

Along with the offset costs that may limit the use of ERCs, there is also the uncertainty of the willingness of offset owners to sell their credits. An owner may have no intention of selling his credits, but rather may hold on to them for his own use, such as for plant expansion. This report is not intended to gauge the real offset bank availability due to economic, business or political factors, but rather it looks at the amounts of ERCs available and simply concludes whether the quantities in the bank are sufficient.

OFFSETS STRATEGIES

To allow for more flexibility and opportunity for project permitting, many districts allow the use of various offset strategies. The inter-offset trading columns in the Attachment C tables include the potential for each district to allow inter-district offsetting, inter-basin offsetting, inter-pollutant offsetting, or inter-sector offsetting.

INTER-DISTRICT OFFSETS

Inter-district offsetting is allowed per California Health and Safety Code Section 40709.6, as long as the neighboring district is in the same air basin. Offsetting emissions between air basins is also allowed under Section 40709.6, with a number of caveats. Inter-basin offsetting allows for offsets to be used from a neighboring district that is located in a different air basin. An example would be the Mojave Desert Air Quality Management District, located in the Southeast Desert Air Basin, allows the use of offsets located in the South Coast Air Quality Management District, which is in the South Coast Air Basin. Such offsets can be used only from "up wind" districts with a worse non-attainment status; the downwind district must be determined by ARB to be overwhelmingly impacted by pollution from the upwind district. Table 3 shows which districts can use emission reductions from neighboring districts in different air basins that meet the two criteria discussed above.

As Table 3 demonstrates, there are quite a few districts north and east of the Sacramento District, and districts east and south of the San Joaquin Valley Unified District that can use offsets from these two large districts.

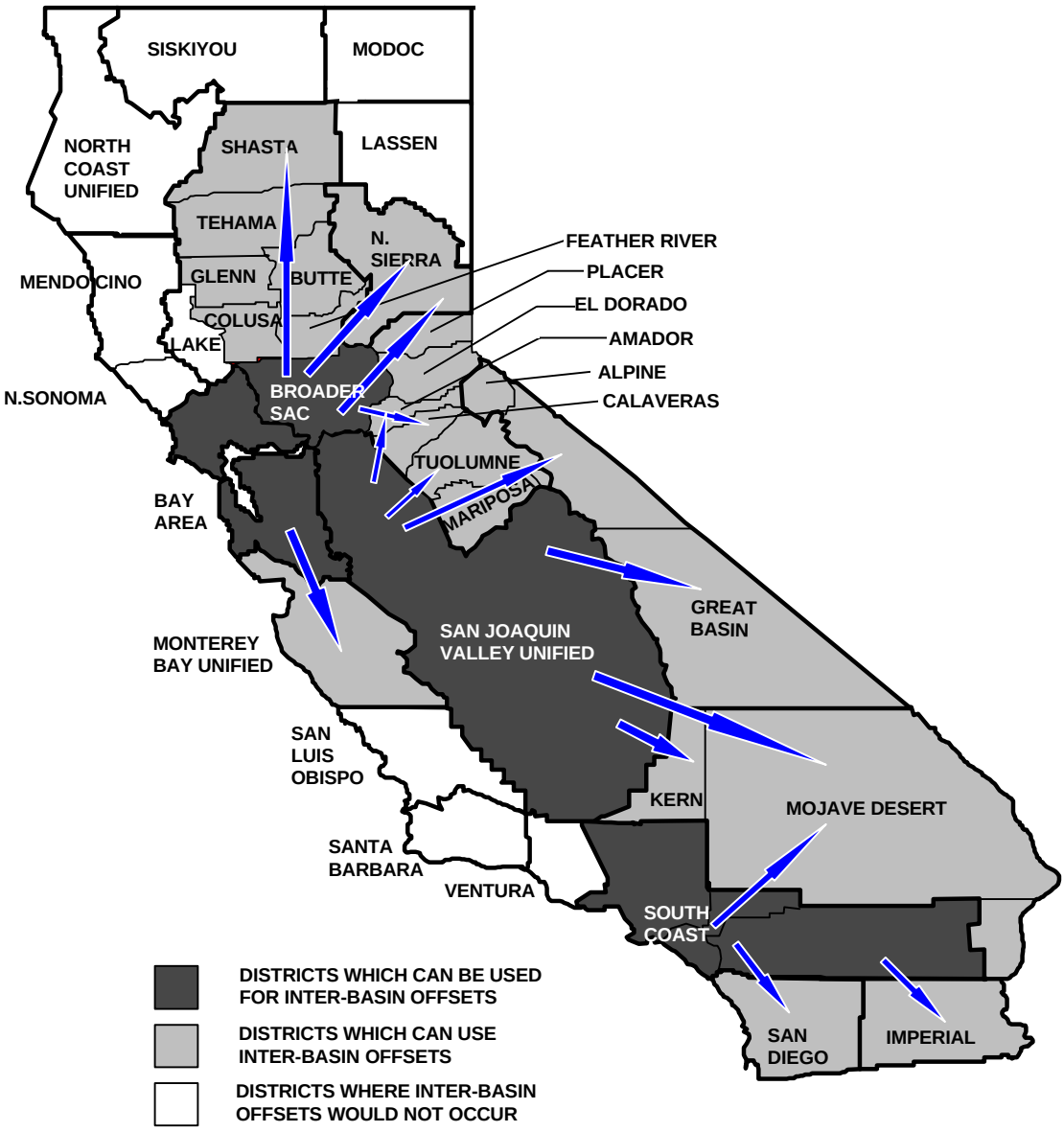
Table 3: Inter-Basin District Trading

Districts which can be used for inter-Basin offsets			
Broader Sacramento Area*	San Joaquin Valley	Bay Area	South Coast
Districts which can use offsets from Districts identified above			
Calaveras Amador El Dorado Placer N. Sierra Colusa Feather River Glenn Butte Tehama Shasta	Amador Calaveras Tuolumne Mariposa Great Basin Kern Desert Mojave Desert	Monterey	San Diego Mojave Desert Imperial

* The Broader Sacramento Area includes the Sacramento Metropolitan Air Quality Management District, the Yolo-Solano Air Pollution Control District, the southern one-third of the Sutter County Air Pollution Control District, and the western portions of the El Dorado and Placer County Air Pollution Control Districts.

Figure 3 is a map that illustrates the district-to-district inter-basin offsets relationships shown in Table 3.

Figure 3: Inter-Basin Offsets Potential



INTER-POLLUTANT TRADING

Inter-pollutant trading is the practice of allowing the use of emissions of one pollutant for offsetting another pollutant. The most common type of inter-pollutant trading is the allowance of VOC credits for NOx emissions, since they both contribute to ozone formation. Another inter-pollutant trading option is the use of NOx and SO_2 emission reduction credits for a PM10 emissions liability. Both NOx and SO_2 are converted to particulates (PM10) in the atmosphere.

INTER-SECTOR TRADING

Inter-sector trading is a relatively new concept which involves a stationary source, such as a power plant, being offset by reductions from area sources, such as agricultural burning or water heaters, or from mobile sources. Mobile source credits can be created by the removal of old cars from operation or the replacement of fleet vehicles, such as buses and commercial truck fleets, with models cleaner than required to meet emissions standards.

CONCLUSIONS - CONSTRAINTS AND OPPORTUNITIES

The far-right columns of the tables in Attachment C contain staff's conclusions regarding whether a project is constrained by offset requirements and ERC/offset availability. A "yes" designation means that we believe there are significant ERC constraints, such as a lack of ERCs (either within a district or within an adjoining district), or there is an inability to trade offsets on an inter-district, inter-basin, inter-pollutant or inter-sector basis. A "maybe" designation indicates that ERC quantities are low, or that a proposed project would consume a significant portion of the ERC bank, or that the possibility of inter-district, inter-basin and or inter-sector offsetting may provide sufficient ERCs to allow permitting of the project. Finally, a "no" designation indicates that we do not find any ERC constraints for a given project being sited in a district. We have transferred these designation criteria to maps of the air districts throughout California, shown as Attachment D. A "no" constraints designation is indicated by those areas in white, a "maybe" designation is shown in gray, and a "yes" designation appears as black.

The case of siting a 240 MW project in Mariposa County is provided as an example to demonstrate the analysis process. The 240 MW table in Attachment C shows that a project of this size would trigger the offset requirements for NOx in the District. The District does not have an ERC bank for NOx or VOC at this time. However, inter-pollutant trading of VOC for NOx is allowed. Inter-basin offsets from the San Joaquin Valley district, which does have an established bank, could be allowed by the Mariposa District. Therefore, it is possible that this size project could be built in the Mariposa District, if the District Air Pollution Control Officer (APCO) allows for the inter-basin offsetting from the San Joaquin Valley District. We have, therefore, designated this scenario in the "maybe" category.

Based on the findings of our analysis, Table 4 categorizes air districts according to their constraints on power plant development for the four projects we evaluated. The

discussion below includes our judgement of the offsetting requirements based on both ozone precursor pollutants (NOx and VOC), and PM10.

Table 4: Air District Constraints for Power Plant Development

Districts with no ERC constraints	Districts in which a project may be sited	Districts with ERC constraints that prohibit siting
Bay Area	Yolo/Solano*	Ventura
Monterey Bay	Sacramento*	Lassen
San Joaquin	Kern Co. (Desert)	Shasta**
South Coast	Santa Barbara	Butte**
San Diego****	Mojave Desert	Tehama**
North Coast	Imperial	Glenn**
Siskiyou	El Dorado**	Colusa**
Modoc	Placer**	Feather River**
Northern Sierra	Amador***	San Luis Obispo
Northern Sonoma	Calaveras***	
Mendocino	Tuolumne***	
Lake	Mariposa***	
	Great Basin***	

* Offsets availability would severely constrain larger projects
** Would have to offset from Sac. Co. Very few offsets available in Sac. Co.
*** Would have to offset from SJV. Sufficient offsets there.
**** There would be no constraints except possibly for the largest size project (400 MW)

Districts in which we believe there are no constraints to siting a power plant project fall into two categories: those districts (Bay Area, Monterey Bay, San Joaquin Valley, South Coast and San Diego) where offsets are required and which have sufficient ERCs available "to cover" the offset liability; and those districts (North Coast, Siskiyou, Modoc, Northern Sierra, Northern Sonoma, Mendocino and Lake Counties) that do not require emission offsets.

The middle column of districts are those districts where we have determined that a project, depending on its size, could possibly not be constrained by a district's permitting requirements. Some districts listed in this category (Yolo/Solano, Sacramento, Kern County, Santa Barbara and Mojave Desert) require offsets and have sufficient offsets for the smaller size projects. However, a larger project would severely deplete their offset banks. Whether an applicant could negotiate with offset providers to secure such a significant share of a district's offsets is a potentially significant constraint. Another group of districts (El Dorado, Amador, Calaveras, Tuolumne,

Mariposa, Great Basin and Imperial) may need to use inter-district or inter-basin offsets, a practice not often used.

The right hand column includes those districts that we feel could probably not successfully permit an energy project in the size range that we evaluated. There are two reasons we believe a project proponent could experience great difficulty in securing an air permit in these districts. First, a district's rules would require emission offsets, but the ERC bank either has no credits or a very small amount of credits. This is the case in the Shasta, Ventura, Lassen and San Luis Obispo Districts. Secondly, even if inter-district offsets were considered, the quantity of offsets in the upwind district (Sacramento) is very low, and probably not sufficient to be used as offsets for districts downwind (Shasta, Butte, Tehama, Glenn, Colusa and Feather River). The combination of a low offset inventory in Sacramento County and the necessity of a high offset ratio (because of distance) would very likely result in insufficient offsets being available to successfully permit a project.

This study gives a good indication where the most likely opportunities exist, from strictly an ERC availability standpoint, to successfully permit a medium to large size gas-fired combustion turbine project. The large urban and industrial districts (Bay Area, Monterey Bay, San Joaquin Valley, South Coast and San Diego) appear to offer the greatest opportunity for ERCs. The rural districts in the north part of the state (Northern Sierra, Modoc, Siskiyou, North Coast, Mendocino, Lake and Northern Sonoma) offer siting opportunities because these districts would not require NOx or VOC offsets.

As pointed out earlier, the use of contemporaneous shutdowns is an offset "wildcard" that we did not evaluate. A district with insufficient ERCs, but with sufficient industrial sources that could accommodate a cogeneration project and provide offsets, may be able to permit such a project. Identifying the magnitude however of such a category of potential offsets would require an in-depth review of the industrial facilities in such districts.

Aside from the availability of ERCs, or the necessity of offsets at all, there are other significant factors, such as gas supply, water supply and transmission access, that also would play a significant role in the site selection for the generation projects identified.

ENDNOTES

[1] New Source Review is a regulatory process that allows for new or modified sources to be built in areas that are not in attainment of the ambient air quality standards, and which emit non-attainment criteria pollutants. The two major components of New Source Review are Best Available Control Technology (BACT) and securing of emission offsets.

[2] Prevention of Significant Deterioration is a federal regulatory process that allows development of new or modified industrial sources in an area that is designated in attainment of the federal ambient air quality standards. The intent of the process is to allow industrial growth incrementaly and to prevent the area from becoming non-attainment. The program usually requires the installation of BACT and an air quality impact assessment.

ATTACHMENT A: SUMMARY OF AIR POLLUTION CONTROL DISTRICT COMMENTS

We provided copies of a draft of this report to each air district in California and the Air Resources Board (ARB) in early December, 1996. We received letters from four air pollution control districts concerning the report.

The Lake County Air District noted that Lake County does not have a natural gas supply which is a major constraint to power plant development. This is an important example which demonstrates that factors other than air quality will affect power plant development.

The Monterey Bay Unified Air Pollution Control District noted that the report did not include the emissions estimates for the four scenarios evaluated, and thus they (the District) could not evaluate the offset applicability independently. Therefore, we have added the emissions scenarios of the four projects as an Attachment to the report.

The District also noted that we did not discuss the "practical" nature of the Emission Reduction Credit (ERC) banking system. Although ERCs may be "available" in the bank, some owners of the offsets may not want to sell them because they either want to hold on to the offsets for their own use (such as plant expansion) or they could not work out a financial deal to purchase the offsets. We have added a short discussion of this to the report but have pointed out that it is not the intent of the report to try to evaluate the cost implications, or political motives, of offset owners to determine the "real" availability of ERCs.

The Glenn County APCD commented that the report did not identify the ERCs that would become available from the phasedown of rice straw burning. The report only addressed ERCs that are currently available, not ERCs that could be available in the future. As an on-going follow-up, we could periodically check with districts on the status of their ERC bank to see if there are noticeable changes.

The Butte County Air Pollution Control District commented that, although Butte County may have insufficient offsets to allow a large power project, recent legislation "would allow the District to waive offset requirements, with the approval of the state ARB."

The legislation they referred to, AB 3319, was signed into law effective January 1, 1997. Basically, this law allows a district which is not classified as extreme for the state ozone standard, to waive the offset requirements for new sources as long as they can demonstrate to the satisfaction of the ARB that other provisions of their state ozone attainment plan will still lead to attainment of the state ozone standard. This only applies to districts that are classified as attainment for the federal ozone standard but non-attainment for the state ozone standard.

ATTACHMENT B: EMISSIONS FROM FOUR HYPOTHETICAL GAS TURBINE POWER PROJECTS

Table B-1: 40 MW Project

- 1 LM6000 combined cycle turbine
- 95% capacity factor

	lb/hr	lb/day	tons/year
NOx	9	176	37
SO2	1	34	4
PM10	3	60	12
VOC	2	59	8

Table B-2: 95 MW Project

- 2 LM6000 turbines (one combined cycle, duct burner & one peaker)
- 95% capacity factor

	lb/hr	lb/day	tons/year
NOx	17	398	48
SO2	3	101	12
PM10	6	148	18
VOC	6	149	17

Table B-3: 240 MW Project

- 1 GE Frame 7F combined cycle turbine
- 95% capacity factor

	lb/hr	lb/day	tons/year
NOx	22	518	98
SO2	2	37	7
PM10	10	312	40
VOC	5	108	43

Table B-4: 400 MW Project

- 2 GE Frame 7F combined cycle turbines
- 95% capacity factor

	lb/hr	lb/day	tons/year
NOx	44	1056	180
SO2	1	24	4
PM10	18	432	75
VOC	9	216	37

ATTACHMENT C: DISTRICT OFFSETS AVAILABILITY TABLES

Table C-1: Statewide District Air Quality Constraints of Small Size Project
40 MW Combustion Turbine Project (One LM6000 turbine)

District	Offsets Required/ERC Bank status								Relative Offset Costs	Inter-Offset Trading Allowed?				**District Offset Barriers?**
	NOx		VOC		PM10		SO2			District	Basin	Pollutant	Sector	
North Coast	no	na	no	na	no	na	no	na	na	no	no	yes	no	no
Shasta	yes	none	no	none	no	none	no	none	na	yes	yes-Sac	yes	yes	maybe: offsets from Sac.Co.
Placer	no	none	no	low	no	low	no	none	low	yes	yes-Sac	yes	yes	no
Sacramento	yes	low	no	low	no	low	no	none	low	yes	no	yes	yes	maybe: NOx, VOC offsets low
Yolo/Solano	yes	med	no	med	no	med	no	med	unk	yes	no	yes	yes	no
Bay Area	no	high	no	high	no	high	no	high	med	no	no	yes	yes	no
Monterey	yes	high	no	high	no	high	no	high	unk	yes	yes-BA	PM10	no	no
San Joaquin	yes	high	no	high	no	high	no	high	med	yes	no	yes	yes	no
Kern Co. (Desert)	yes	low	no	med	no	low	no	none	low	yes	yes-SJV	yes	yes	no
Santa Barbara	yes	na	no	na	no	na	no	na	med	yes	no	yes	no	no: should be sufficient NOx offsets
Ventura	yes	high	yes	high	no	low	no	low	high	no	no	no	no	no
Mojave Desert	yes	na	no	na	no	na	no	na	na	yes	yes-SC	yes	yes	no: should be sufficient NOx offsets
South Coast	yes	high	yes	high	yes	high	na	high	med	yes	no	PM10	yes	no
San Diego	yes	low	no	high	no	high	no	none	med	no	yes-SC	yes	no	no: can trade VOC for NOx
Imperial	yes	none	no	none	no	none	no	none	na	yes	no	yes	no	maybe: offsets from South Coast
Siskiyou	no	na	no	na	no	na	no	na	na		no			no
Modoc	no	na	no	na	no	na	no	na	na		no			no
Lassen	no	na	no	na	no	na	no	na	na		no			no
Northern Sierra	no	na	no	na	no	na	no	na	na		yes-Sac			no
Butte	yes	none	no	none	no	none	no	none	unk	yes	yes-Sac	yes	yes	maybe:offsets from Sac.Co.
Tehama	yes	none	no	none	no	none	no	none	unk	yes	yes-Sac	yes	yes	maybe:offsets from Sac.Co.

Table C-1 (Continued)

District	Offsets Required/ERC Bank status								Relative Offset Costs	Inter-Offset Trading Allowed?				District A/Q Barriers?
	NOx		VOC		PM10		SO2			District	Basin	Pollutant	Sector	
Glenn	yes	none	no	none	no	none	no	none	na	yes	yes-Sac	yes	yes	maybe:offsets from Sac.Co.
Mendocino	no	na	no	na	no	na	no	na	na		no			no
N. Sonoma	no	na	no	na	no	na	no	na	na		no			no
Lake	no	na	no	na	no	na	no	na	na		no			no
Colusa	yes	low	no	low	no	low	no	low	unk	APCO	yes-Sac	pm10	yes	maybe: offset only above 25t/yr
Feather River	yes	low	no	low	no	low	no	low	unk	yes	yes-Sac	yes	yes	maybe: offset only above 25t/yr
El Dorado	yes	none	yes	none	no	none	no	none	na	yes	yes-Sac	yes	yes	maybe: offsets from Sac. Co.
Amador	no	none	no	none	no	none	no	none	na	yes	yes-SJV & Sac	yes	yes	no
Calaveras	no	none	no	none	no	none	no	none	na	yes	yes-SJV & Sac	yes	yes	no
Tuolumne	no	none	no	none	no	none	no	none	na	yes	yes-SJV	yes	APCO	no
Mariposa	no	none	no	none	no	none	no	none	na	yes	yes-SJV	yes	APCO	no
Great Basin	no	none	no	none	no	none	no	none	na	APCO	yes-SJV	yes	APCO	no
San Luis Obispo	yes	none	no	none	no	none	no	none	na	APCO	no	yes	yes	yes: no NOx or VOC offsets

yes - denotes that offsets or types (inter-offset) apply
no - denotes that offsets or types (inter-offset) do not apply

ERC Bank Status Determination:
high - Bank is > 200% of project emissions
medium - Bank is > 50% and < 200% of project emissions
low - Bank is < 50% of project emissions
none - No credits available
na - ERC bank non-existent or under development
unk - unknown

Relative Costs
high: > $20,000/ton
medium: > $5000 & < $20,000/ton
low: < $5000/ton
na - not available since no offset bank
unk - costs of offsets not known

Inter Offset Trading Explanations
Inter District: allow offsets from neighbor district
Inter Basin: allow offsets from neighbor air basin
District where inter-Basin offsets could be secured:
BA- Bay Area, Sac- Sacramento, SJV- San Joaquin Valley, SC- South Coast
Inter Pollutant: allow for different pollutant trading (i.e. VOC for NOx, SO_2 for PM10)
Inter Sector: allow for area and/or mobile offsets for point sources

Table C-2: Statewide District Air Quality Constraints of Medium Size Project 95 MW Combustion Turbine Project (Two LM6000 turbines)

District	Offsets Required/ERC Bank status								Relative Offset Costs	Inter-Offset Trading Allowed?				**District Offset Barriers?**
	NOx		VOC		PM10		SO2			District	Basin	Pollutant	Sector	
North Coast	no	na	no	na	no	na	no	na	na	no	no	yes	no	no
Shasta	yes	none	no	none	yes	low	no	none	na	yes	yes-Sac	yes	yes	maybe: offsets from Sac.Co.
Placer	yes	none	yes	low	yes	low	no	none	low	yes	yes-Sac	yes	yes	maybe: offsets from Sac.Co.
Sacramento	yes	low	no	low	yes	low	no	none	low	yes	no	yes	yes	maybe:NOx,VOC,PM10 offsets low
Yolo/Solano	yes	med	yes	med	yes	med	no	med	unk	yes	no	yes	yes	no
Bay Area	no	high	no	high	no	high	no	high	med	no	no	yes	yes	no
Monterey	yes	high	yes	high	yes	high	no	high	unk	yes	yes-BA	PM10	no	no
San Joaquin	yes	high	yes	high	yes	high	no	med	med	yes	no	yes	yes	no
Kern Co.(Desert)	yes	low	no	med	yes	low	no	none	low	yes	yes-SJV	yes	yes	maybe: NOx, PM10 offsets low
Santa Barbara	yes	na	no	na	yes	na	no	na	med	yes	no	yes	no	maybe:depends on comtemp.offsets
Ventura	yes	high	yes	high	yes	low	no	low	high	no	no	no	no	yes: insuff. PM10 offsets
Mojave Desert	yes	na	no	na	no	na	no	na	na	yes	yes-SC & SJV	yes	yes	maybe: NOx, PM10 offsets
South Coast	yes	high	yes	high	yes	high	no	high	med	yes	no	PM10	yes	no
San Diego	yes	low	yes	high	yes	high	no	none	med	no	yes-SC	yes	yes	no: can trade VOC for NOx
Imperial	yes	none	no	none	yes	none	yes	none	na	yes	yes-SC	yes	no	maybe: offsets from South Coast
Siskiyou	no	na	no	na	no	na	no	na	na		no			no
Modoc	no	na	no	na	no	na	no	na	na		no			no
Lassen	yes	none	no	na	no	na	no	na	na		no			yes: lack of NOx offsets
Northern Sierra	no	na	no	na	no	na	no	na	na		yes-Sac			no
Butte	yes	none	no	none	no	none	no	none	unk	yes	yes-Sac	yes	yes	maybe:offsets from Sac. Co
Tehama	yes	none	no	none	no	none	no	none	unk	yes	yes-Sac	yes	yes	maybe:offsets from Sac. Co.

Table C-2 (Continued)

District	Offsets Required/ERC Bank status								Relative Offset Costs	Inter-Offset Trading Allowed?				**District A/Q Barriers?**
	NOx		VOC		PM10		SO2			District	Basin	Pollutant	Sector	
Glenn	yes	none	no	none	no	none	no	none	na	yes	yes-Sac	yes	yes	maybe:offsets from Sac.Co.
Mendocino	no	na	no	na	no	na	no	na	na		no			no
N. Sonoma	no	na	no	na	no	na	no	na	na		no			no
Lake	no	na	no	na	no	na	no	na	na		no			no
Colusa	yes	low	no	low	no	low	no	none	unk	APCO	yes-Sac	PM10	yes	maybe: offsets from Sac. Co.
Feather River	yes	low	no	low	no	low	no	none	unk	yes	yes-Sac	yes	yes	maybe: offsets from Sac. Co
El Dorado	yes	none	yes	none	yes	none	no	none	na	yes	yes-Sac	yes	yes	maybe: offsets from Sac Co
Amador	yes	none	no	none	no	none	no	none	na	yes	yes-SJV & Sac	yes	yes	maybe: offsets from SJV or Sac. Co.
Calaveras	yes	none	no	none	no	none	no	none	na	yes	yes-SJV & Sac	yes	yes	maybe: offsets from SJV or Sac. Co.
Tuolumne	yes	none	no	none	no	none	no	none	na	yes	yes-SJV	yes	APCO	maybe: offset from SJV.
Mariposa	yes	none	no	none	no	none	no	none	na	yes	yes-SJV	yes	APCO	maybe: offsets from SJV.
Great Basin	yes	none	no	none	no	none	no	none	na	APCO	yes-SJV	yes	APCO	maybe: offset from SJV.
San Luis Obispo	yes	none	no	none	no	none	no	none	na	APCO	no	yes	yes	yes: no offsets

yes - denotes that offsets or types (inter-offset) apply
no - denotes that offsets or types (inter-offset) do not apply

ERC Bank Status Determination:
high - Bank is > 200% of project emissions
medium - Bank is > 50% and < 200% of project emissions
low - Bank is < 50% of project emissions
none - No credits available
na - ERC bank non-existent or under development
unk - unknown

Relative Costs
high: > $20,000/ton
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Inter Offset Trading Explanations
Inter District: allow offsets from neighbor district
Inter Basin: allow offsets from neighbor air basin
District where inter-Basin offsets could be secured:
BA- Bay Area, Sac- Sacramento, SJV- San Joaquin Valley, SC- South Coast
Inter Pollutant: allow for different pollutant trading
(i.e. VOC for NOx, SO_2 for PM10)
Inter Sector: allow for area and/or mobile offsets for point sources

Table C-3: Statewide District Air Quality Constraints of Large Size Project
240 MW Combustion Turbine Project (One combined cycle Frame 7F turbine)

District	Offsets Required/ERC Bank status								Relative Offset Costs	Inter-Offset Trading Allowed?				**District Offset Barriers?**
	NOx		VOC		PM10		SO2			District	Basin	Pollutant	Sector	
North Coast	no	na	no	na	no	na	no	na	na	no	no	yes	no	no
Shasta	yes	none	no	none	yes	none	no	none	na	yes	yes-Sac	yes	yes	maybe:offsets from Sac. Co.
Placer	yes	none	yes	low	yes	low	no	none	low	yes	yes-Sac	yes	yes	maybe: offsets from Sac. Co.
Sacramento	yes	low	no	low	yes	low	no	none	low	yes	no	yes	yes	maybe:NOx,VOC,PM10 offsets low
Yolo/Solano	yes	low	yes	med	yes	med	no	med	unk	yes	no	yes	yes	maybe: project depleting ERC bank
Bay Area	yes	high	no	high	no	high	no	high	med	no	no	yes	yes	no
Monterey	yes	high	yes	high	yes	high	no	high	unk	yes	yes-BA	PM10	no	no
San Joaquin	yes	high	yes	high	yes	high	no	med	med	yes	no	yes	yes	no
Kern Co.(Desert)	yes	low	no	med	yes	low	no	none	low	yes	yes-SJV	yes	yes	maybe: NOx, PM10 offsets low
Santa Barbara	yes	na	no	na	yes	na	no	na	med	yes	no	yes	no	maybe:depends on comtemp.offsets
Ventura	yes	high	yes	high	yes	low	no	low	high	no	no	no	no	yes: insuff. PM10 offsets
Mojave Desert	yes	na	yes	na	yes	na	no	na	na	yes	yes-SC & SJV	yes	yes	maybe:shortage of NOx,VOC,PM10
South Coast	yes	high	yes	high	yes	high	no	high	med	yes	no	PM10	yes	no
San Diego	yes	low	yes	med	yes	high	no	none	med	yes	yes-SC	yes	no	no: can trade VOC for NOx
Imperial	yes	none	no	none	yes	none	no	none	na	yes	yes-SC	yes	no	maybe: offsets from South Coast
Siskiyou	no	na	no	na	no	na	no	na	na		no			no
Modoc	no	na	no	na	no	na	no	na	na		no			no
Lassen	yes	none	no	na	yes	none	no	na	na		no			yes: lack of NOx, PM10 offsets
Northern Sierra	no	na	no	na	no	na	no	na	na		yes-Sac			no
Butte	yes	none	yes	none	no	none	no	none	unk	yes	yes-Sac	yes	yes	maybe:offsets from Sac. Co.
Tehama	yes	none	yes	none	no	none	no	none	unk	yes	yes-Sac	yes	yes	maybe:offsets from Sac.Co.

Table C-3 (Continued)

District	Offsets Required/ERC Bank status								Relative Offset Costs	Inter-Offset Trading Allowed?				**District A/Q Barriers?**
	NOx		VOC		PM10		SO2			District	Basin	Pollutant	Sector	
Glenn	yes	none	yes	none	no	none	no	none	na	yes	yes-Sac	yes	yes	maybe: offsets from Sac. Co.
Mendocino	no	na	no	na	no	na	no	na	na		no			no
N. Sonoma	no	na	no	na	no	na	no	na	na		no			no
Lake	no	na	no	na	no	na	no	na	na		no			no
Colusa	yes	low	yes	low	yes	low	no	none	unk	APCO	yes-Sac	PM10	yes	maybe: offsets from Sac. Co.
Feather River	yes	low	yes	low	yes	low	no	none	unk	yes	yes-Sac	yes	yes	maybe: offsets from Sac. Co.
El Dorado	yes	none	yes	none	yes	none	no	none	na	yes	yes-Sac	yes	yes	maybe: offsets from Sac Co
Amador	yes	none	no	none	yes	none	no	none	na	yes	yes-SJV & Sac	yes	yes	maybe: offsets from SJV or Sac. Co.
Calaveras	yes	none	no	none	yes	none	no	none	na	yes	yes-SJV & Sac	yes	yes	maybe: offsets from SJV or Sac. Co.
Tuolumne	yes	none	no	none	yes	none	no	none	na	yes	yes-SJV	yes	APCO	maybe: offsets from SJV.
Mariposa	yes	none	no	none	yes	none	no	none	na	yes	yes-SJV	yes	APCO	maybe: offsets from SJV.
Great Basin	yes	none	no	none	yes	none	no	none	na	APCO	yes-SJV	yes	APCO	maybe: offsets from SJV.
San Luis Obispo	yes	none	yes	none	yes	none	no	none	na	APCO	no	yes	yes	yes: insufficient offsets

yes - denotes that offsets or types (inter-offset) apply
no - denotes that offsets or types (inter-offset) do not apply

ERC Bank Status Determination:
high - Bank is > 200% of project emissions
medium - Bank is > 50% and < 200% of project emissions
low - Bank is < 50% of project emissions
none - No credits available
na - ERC bank non-existent or under development
unk - unknown

Relative Costs
high: > $20,000/ton
medium: > $5000 & < $20,000/ton
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na - not available since no offset bank
unk - costs of offsets not known

Inter Offset Trading Explanations
Inter District: allow offsets from neighbor district
Inter Basin: allow offsets from neighbor air basin
District where inter-Basin offsets could be secured:
BA- Bay Area, Sac- Sacramento, SJV-San Joaquin Valley, SC-South Coast
Inter Pollutant: allow for different pollutant trading
(i.e. VOC for NOx, SO_2 for PM10)
Inter Sector: allow for area and/or mobile offsets for point sources

Table C-4: Statewide District Air Quality Constraints of Large Size Project
400 MW Combustion Turbine Project (Two Frame 7F combined cycle turbine sets)

District	Offsets Required/ERC Bank status								Relative Offset Costs	Inter-Offset Trading Allowed?				**District Offset Barriers?**
	NOx		VOC		PM10		SO2			District	Basin	Pollutant	Sector	
North Coast	no	na	no	na	no	na	no	na	na	no	no	yes	no	no
Shasta	yes	none	yes	none	yes	none	no	none	na	yes	no	yes	yes	yes: offsets include adj. Districts
Placer	yes	none	yes	low	yes	low	no	none	low	yes	yes-Sac	yes	yes	yes: insuf NOx,VOC,PM10 offsets
Sacramento	yes	low	yes	low	yes	low	no	none	low	yes	no	yes	yes	yes: insuf NOx,VOC,PM10 offsets
Yolo/Solano	yes	low	yes	med	yes	med	no	med	unk	yes	no	yes	yes	maybe: project depleting ERC bank
Bay Area	yes	high	no	high	no	--	no	high	med	no	no	yes	yes	no
Monterey	yes	high	yes	high	yes	high	no	high	unk	yes	yes-BA	PM10	no	no
San Joaquin	yes	high	yes	high	yes	high	no	med	med	yes	no	yes	yes	no
Kern Co.(Desert)	yes	low	yes	med	yes	low	no	none	low	yes	yes-SJV	yes	yes	maybe: NOx, PM10 offsets low
Santa Barbara	yes	na	yes	na	yes	na	no	na	med	yes	no	yes	no	maybe:depends on comtemp.offsets
Ventura	yes	med	yes	high	yes	low	no	low	high	no	no	no	no	yes: insufficient offsets
Mojave Desert	yes	na	yes	na	yes	na	no	na	na	yes	yes-SC & SC	yes	yes	maybe:short NOx,VOC,PM10 offsets
South Coast	yes	high	yes	high	yes	high	no	high	med	yes	no	PM10	yes	no
San Diego	yes	low	yes	low	yes	high	no	none	med	yes	yes-SC	yes	no	maybe:project depleting ERC bank
Imperial	yes	none	yes	none	yes	none	no	none	na	yes	yes-SC	yes	no	maybe: offsets from South Coast
Siskiyou	no	na	no	na	no	na	no	na	na		no			no
Modoc	no	na	no	na	no	na	no	na	na		no			no
Lassen	yes	none	no	na	yes	none	no	na	na		no			yes: lack of NOx, PM10 offsets
Northern Sierra	no	na	no	na	no	na	no	na	na		yes-Sac			no
Butte	yes	none	yes	none	yes	none	no	none	unk	yes	yes-Sac	yes	yes	yes - offsets, include adj. Districts
Tehama	yes	none	yes	none	yes	none	no	none	unk	yes	yes-Sac	yes	yes	yes - offsets, include adj. Districts

Table C-4 (Continued)

District	Offsets Required/ERC Bank status								Relative Offset Costs	Inter-Offset Trading Allowed?				**District A/Q Barriers?**
	NOx		VOC		PM10		SO2			District	Basin	Pollutant	Sector	
Glenn	yes	none	yes	none	yes	none	no	none	na	yes	yes-Sac	yes	yes	yes - offsets, include adj. Districts
Mendocino	no	na	no	na	no	na	no	na	na		no			no
N. Sonoma	no	na	no	na	no	na	no	na	na		no			no
Lake	no	na	no	na	no	na	no	na	na		no			no
Colusa	yes	low	yes	low	yes	low	no	none	unk	APCO	yes-Sac	PM10	yes	yes: insufficient offsets
Feather River	yes	low	yes	low	yes	low	no	none	unk	yes	yes-Sac	yes	yes	yes: insufficient offsets
El Dorado	yes	none	yes	none	yes	none	no	none	na	yes	yes-Sac	yes	yes	yes:insufficient offsets
Amador	yes	none	no	none	yes	none	no	none	na	yes	yes-SJV & Sac	yes	yes	maybe: offsets from SJV.
Calaveras	yes	none	no	none	yes	none	no	none	na	yes	yes-SJV & Sac	yes	yes	maybe: offsets from SJV.
Tuolumne	yes	none	no	none	yes	none	no	none	na	yes	yes-SJV	yes	APCO	maybe: offsets from SJV.
Mariposa	yes	none	no	none	yes	none	no	none	na	yes	yes-SJV	yes	APCO	maybe: offsets from SJV.
Great Basin	yes	none	no	none	yes	none	no	none	na	APCO	yes-SJV	yes	APCO	maybe: offsets from SJV.
San Luis Obispo	yes	none	yes	none	yes	none	no	none	na	APCO	no	yes	yes	yes: insufficient offsets

yes - denotes that offsets or types (inter-offset) apply
no - denotes that offsets or types (inter-offset) do not apply

ERC Bank Status Determination:
high - Bank is > 200% of project emissions
medium - Bank is > 50% and < 200% of project emissions
low - Bank is < 50% of project emissions
none - No credits available
na - ERC bank non-existent or under development
unk - unknown

Relative Costs
high: > $20,000/ton
medium: > $5000 & < $20,000/ton
low: < $5000/ton
na - not available since no offset bank
unk - costs of offsets not known

Inter Offset Trading Explanations
Inter District: allow offsets from neighbor district
Inter Basin: allow offsets from neighbor air basin
District where inter-Basin offsets could be secured:
BA- Bay Area, Sac- Sacramento, SJV- San Joaquin Valley, SC- South Coast
Inter Pollutant: allow for different pollutant trading
(i.e. VOC for NOx, SO_2 for PM10)
Inter Sector: allow for area and/or mobile offsets for point sources

ATTACHMENT D: DISTRICT ERC CONSTRAINTS MAPS

Figure D-1: District ERC Constraint for 40 MW Combustion Turbine Project

Figure D-2: District ERC Constraint for 95 MW Combustion Turbine Project

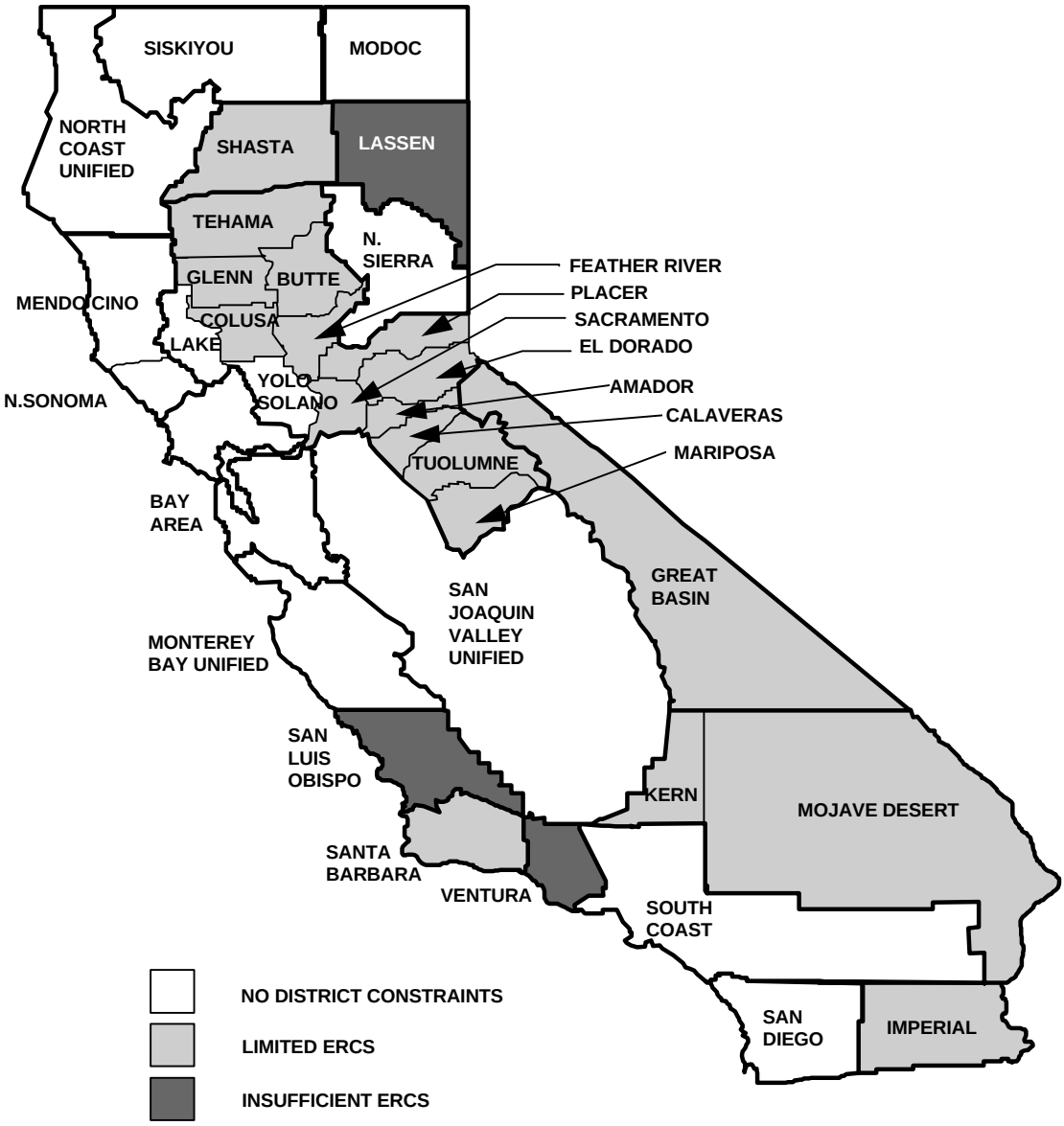

Figure D-3: District ERC Constraint for 240 MW Combustion Turbine Project

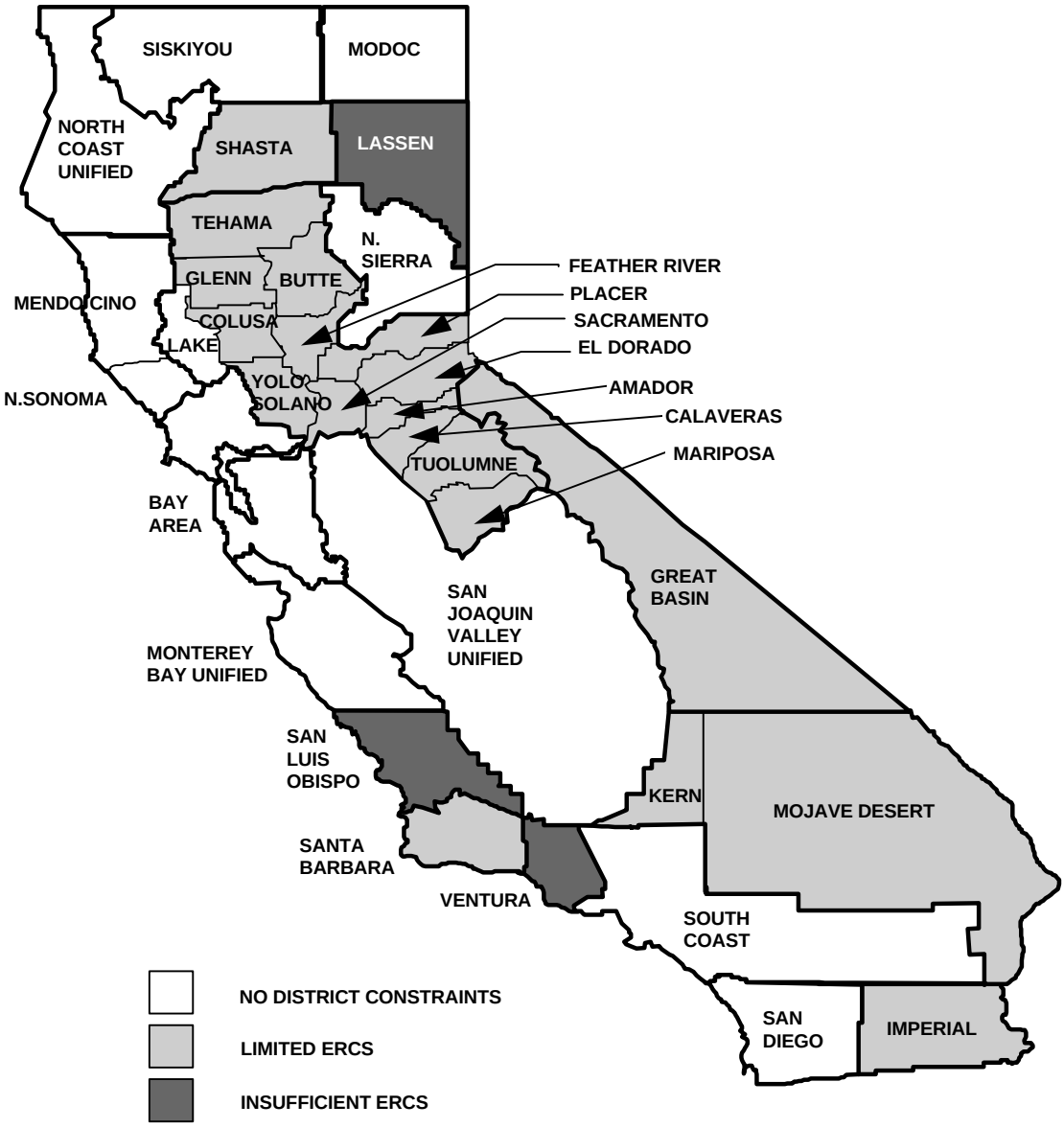

Figure D-4: District ERC Constraint for 400 MW Combustion Turbine Project